

SEVERE LOCAL HAIL AND WIND STORMS, NOVEMBER, 1924

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Madison, Wis.....	6	9:53-9:58 p. m.	3,520	-----	\$200-\$300	Heavy hail.....	Damage principally to greenhouses.....	Official, U. S. Weather Bureau.
Walla Walla, Wash., and vicinity.	7	-----	-----	-----	-----	Wind.....	Some damage to poles, wires and trees in the city and adjacent country.	Do.
Fort Wayne, Ind.....	7	-----	-----	-----	-----	High wind.....	Trees and power lines damaged.....	Do.
Alta, Iowa.....	11	7 a. m.	-----	-----	-----	Heavy hail.....	Very light damage.....	Do.
Mt. Pleasant, Iowa.....	11	Noon	-----	-----	-----	do.....	No appreciable damage.....	Do.
Keokuk, Iowa.....	11	12:30 p. m.	-----	-----	-----	Hail.....	Window glass broken.....	Do.
Macoupin County, Ill. (northwest part of).	11	-----	-----	-----	15,000	Small tornado.....	Farm property damaged. One person injured.....	Do.
Birch Tree, Mo.....	11	-----	-----	-----	-----	Tornadoic wind.....	Considerable damage, character of which was not reported.	Do.
Seymour, Mo.....	11	-----	-----	-----	-----	Tornadoic wind with hail.	Minor damage reported.....	Do.
New England.....	17	-----	-----	-----	-----	High wind and cold wave.	Shipping tied up; trees, signs, and awnings damaged.	Do.
North Head, Wash.....	20	1:30 a. m.	-----	-----	-----	Thunderstorm.....	Communication lines out of commission.....	Do.
Seattle, Wash.....	21	10:13-11:15 p. m.	-----	-----	-----	Thunderstorm, rain and hail.	Tower blown down; wires wrecked.....	Do.
Ward, S. C.....	21	10:30 p. m.	-----	-----	5,000	Thunderstorm and wind.	Residences, tenant houses, outbuildings, and timber damaged.	Do.
New England.....	22	-----	-----	-----	-----	Snow, sleet and wind.	Thousands of dollars damage to telephone, telegraph, and electric systems; many trees destroyed; trains delayed.	Official, U. S. Weather Bureau, Boston Herald (Mass.).
Douglas, Ga.....	23	-----	-----	-----	-----	High wind.....	Lights and a few small houses damaged.....	Official, U. S. Weather Bureau.

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STORMS AND WEATHER WARNINGS

WASHINGTON FORECAST DISTRICT

On the morning of the 2d a disturbance of moderate intensity was over the St. Lawrence Valley and fresh to strong west and northwest winds were forecast for the New England coast and strong winds attaining moderate gale force at times occurred during the ensuing 24 hours.

On the evening of the 7th, with a disturbance over the upper St. Lawrence Valley, southwest storm warnings were ordered for the New England coast and strong winds and moderate gales occurred substantially as indicated.

On the evening of the 8th a tropical disturbance of slight intensity was near Santiago, Cuba. After moving slowly northward to about latitude 22° and longitude 76° by the evening of the 9th, its progress was checked by a high-pressure area that covered the Atlantic States. During the next 36 hours it advanced eastward to a position just west of Turks Island. Thus far its progress had been slow, but beginning with the morning of the 11th its rate of movement increased as it passed north-northeastward to a position about 200 miles southeast of Bermuda by the evening of the 13th. Its subsequent course was apparently northeastward. The disturbance was of small diameter and considerable intensity near the center. On the evening of the 10th the U. S. S. *Concord* in latitude 21° 35' N., and longitude 74° 15' W. passed near the storm center, reporting a pressure reading of 29.40 inches and a wind velocity of 82 miles per hour.

Beginning with the evening of the 8th advices concerning the location, probable intensity and direction of movement of this disturbance were issued twice daily.

In connection with a disturbance of increasing intensity which was over Nova Scotia on the evening of the 16th, storm warnings were ordered from Nantucket to Eastport and warnings of strong northwest winds off the coast were disseminated by radio. This offshore blow continued into the night of the 17th.

In the trough of the disturbance that was over Lake Michigan on the morning of the 21st, a secondary depression developed over the east Gulf States. During the next 24 hours it had advanced to the North Carolina coast with greatly increased intensity and by the morning

of the 24th it was over the lower St. Lawrence, having caused gales along the entire Atlantic seaboard, warnings of which were ordered well in advance.

On the morning of the 27th storm warnings were ordered for the Atlantic coast from Delaware Breakwater to Nantucket, but due to the decrease in intensity of the low-pressure area, which had moved from Ontario to western Quebec during the day, storm warnings were ordered down at 9.30 p. m.

On the morning of the 29th small-craft warnings were ordered from Norfolk to Nantucket in connection with a disturbance that was over New Jersey and moving northward. On the evening of that date, when the disturbance was over Massachusetts with increased intensity, north-west storm warnings were ordered from Block Island to Eastport. Strong winds occurred from Hatteras northward.

On the 16th warnings for light to heavy frosts were disseminated for portions of the South Atlantic and east Gulf States and were justified. On the 19th frosts occurred quite generally in the interior of the South Atlantic and east Gulf States and in Tennessee. Warnings were issued on that date for heavy to killing frosts on the following morning in the interior of North and South Carolina and for north and central Georgia, and these frosts occurred as indicated. Frost warnings were again distributed on the 24th and 25th for portions of the Atlantic and east Gulf States. On the 29th warnings of light to heavy frost were issued for extreme northern Florida and occurred as forecast.—R. H. Weightman.

CHICAGO FORECAST DISTRICT

The weather, as a whole, throughout the Chicago Forecast District during November was characterized by temperatures above the normal, especially on the Great Plains, but in some areas there was a deficiency in temperature, mainly in the extreme northern Rocky Mountain region and northeastern Minnesota. There was also a deficiency of precipitation which was almost general.

Storm warnings.—In consequence of the above-mentioned mild conditions, barometric disturbances crossing the district were, for the most part, not severe, but of

only moderate or even slight intensity. Storm warnings were ordered for the Great Lakes from time to time, and these warnings were, in a large majority of cases, fully justified. As the storms were not unusual, no detailed description is necessary.

Cold-wave warnings.—No general cold-wave warnings were ordered during the month, but these advices were confined to localities in the Northwest and in the Plains States on two or three days only. The principal cold wave appeared in the Canadian Northwest on the night of the 11th, and gradually pushed southward and eastward, finally causing a considerable fall in temperature over the entire forecast district, although in middle districts it was not of cold-wave proportions.

Beekkeepers' forecasts.—In response to requests received from the county agricultural agent, Phillips, Wis., and Mr. C. F. Rife, Naperville, Ill., that special forecasts be furnished them in the interests of honey producers whenever midday temperatures of 50° or more to be followed by cloudy and cooler weather were expected, advices were sent to them on November 18, indicating two days of mild temperature. On the 22d they were further advised, however, that following that date they could hardly look for any more such periods. Similar advices are being furnished to members of the American Honey Producers' League in the month of November, so that they may delay placing their bees in the cellar for the period of hibernation until there is no longer any likelihood of favorable flying weather, during which the bees may make their final cleansing flight.

Fire-weather forecasts.—Because of the prevalence of forest fires in the east-central portion of the Lower Michigan peninsula fire-weather forecasts were requested by the United States Forest Supervisor at East Tawas, Mich., on October 25, 1924, and these forecasts were continued until the fire hazard had passed, November 16. A letter from the forest supervisor states that "The forecasts have been of considerable assistance to us, and we wish to thank you for your cooperation in the matter."

During the winter season special advices, covering the probable temperature conditions during the balance of the week in the northwestern States, are sent each Monday morning to several addresses in the north Pacific States, for use in connection with the shipment of perishable fruit eastward; and whenever cold waves are imminent additional information is sent. As the temperature in that area was rather variable, ranging from fairly mild to rather cold, special attention had to be given to the service, and it is believed that the shippers interested were much benefited by the forecasts furnished. When periods of mild weather were in prospect, the shippers were, of course, so advised, as well as upon the approach of cold weather.—*H. J. Cox.*

NEW ORLEANS FORECAST DISTRICT

Cold-wave warnings were issued for Oklahoma on the 6th, and for Oklahoma and the extreme northwest portion of East Texas on the 23d, and were justified. Livestock warnings were issued for Oklahoma and the Texas Panhandle on the 6th and 13th, and for Oklahoma, the Texas Panhandle and the extreme northwest portion of East Texas on the 23d and the southern portion of West Texas on the 24th. Frost occurred as far south as the Louisiana and Texas coast on the 25th and reached the Louisiana coast on the 26th, for which timely warnings were issued; radiation was intense and frost heavy to killing almost to the coast.

No storm warnings were issued and no general storm occurred on the Gulf coast. Winds of 34 miles per hour for short periods were recorded at Galveston, Tex., during the night of the 23d-24th.—*I. M. Cline.*

DENVER FORECAST DISTRICT

Two storms which were attended by precipitation in Colorado, northern Arizona and Utah crossed the district from the northwest during the first 10 days of the month. Another disturbance, attended by light snow in western Colorado, northern Arizona and Utah, and by showers in eastern and southern New Mexico, appeared over Arizona on the 11th and advanced to Texas by the 14th. High pressures prevailed on the Rocky Mountain Plateau from the 13th to the 30th, with fair weather, except that occasional light precipitation in Colorado and northern New Mexico on the 18th, and 19th resulted from a moderate disturbance which advanced northeastward from Arizona, and light snows in central and eastern Colorado on the 23d and 26th attended moderate secondary disturbances that developed on the eastern slope of this State.

Warnings of a moderate cold wave in northeastern Arizona and southwestern Utah were issued on the morning of the 5th, and in southwestern Colorado and northern and extreme eastern New Mexico on the morning of the 6th. Warnings of a moderate cold wave in central and eastern Colorado and southwestern Utah were also issued on the morning of the 10th. All three of these warnings were verified. Another warning of a moderate cold wave, which was verified, was issued for eastern Colorado on the morning of the 26th.

At 2 p. m. of the 12th, when an area of high pressure was central over eastern Montana, with severe, low temperatures on the northeastern Rocky Mountain slope and a low of considerable intensity covered Arizona and northern New Mexico, warnings of a severe cold wave and livestock warnings were issued for eastern Colorado and of a moderate cold wave, with livestock warnings, for northeastern New Mexico. The cold-wave warnings were repeated on the evening of the same day. The high, however, divided, the portion east of the mountains moving rapidly southeastward, while the low in the Southwest decreased in intensity. A moderate cold wave occurred in southeastern Colorado, with sharply lower temperatures in extreme northeastern New Mexico. Snow, a forecast of which had been included in the livestock warnings, failed to occur in eastern Colorado, although heavy rain and sleet fell at Amarillo, Tex.

Cold waves without warnings occurred at Leadville, Colo., on the 6th-7th and 23d, at Grand Junction on the 11th and in eastern New Mexico on the 24th.

Frost warnings were issued as follows: Heavy frost in south-central and southeastern Arizona on the 6th and in south-central and southwestern New Mexico on the 7th; frost in south-central and southeastern Arizona on the 7th, 11th, 24th, 25th, 27th, and 28th; frost in southern Arizona on the 12th, 13th and 26th. The warnings were generally verified.—*J. M. Sherier.*

SAN FRANCISCO FORECAST DISTRICT

At the beginning of the month the barometric pressure was abnormally high over the Alaskan area and low over the ocean east of longitude 160° west, and this situation continued during the first 10 days of the month. The result was a succession of lows from the ocean which

produced daily rains over the North Pacific States and a substantial rainfall in nearly all parts of California. The last of this series of lows passed inland on the 9th, attended by general rains over the entire State of California, and this was quickly followed by rising pressure over the ocean and falling pressure over the Aleutian Islands and the Gulf of Alaska. The storms of the first 10 days of the month made necessary the frequent display of storm warnings on the coasts of the north Pacific States and also on the north California coast. These warnings were in practically every instance verified. During the period from the 10th to the 14th the pressure rose decidedly over the region west of the Rocky Mountains and the weather became unduly cool for the season, with frequent frosts in California and freezing temperatures in other interior parts of this forecast district, but there was no appreciable damage done thereby.

From the 11th on to the 21st the pressure remained abnormally low over the Aleutian Islands and the north part of the Gulf of Alaska, and it was observed during this period that while rains were frequent in Washington and Oregon and extreme northwestern California, no rain fell elsewhere in California. While the center of this main depression was over the Alaskan region referred to, one secondary depression after another passed from it eastward, requiring frequent displays of storm warnings north of Cape Blanco. These displays were practically without exception followed by winds of gale force, with thick, rainy weather, along that part of the coast where the warnings were ordered. At the same time there was a tendency for high barometric pressure to persist over the plateau region. The most significant of these areas of maximum pressure appeared over the northwestern States on the 22d and, moving slowly east-southeastward, dominated the meteorological conditions west of the Rocky Mountains until the end of the month. It is worthy of note that this high pressure made its appearance over the Northwestern States following the eastward movement of an area of high barometer of equal magnitude which first made its appearance north of Midway Island on the 17th and 18th. In other words, the apparent period of time required for this HIGH to cross the eastern Pacific from the longitude of Midway Island was approximately between four and five days, or at the rate of 10°, in longitude, per day.

Following the 21st another deep depression moved eastward over the Aleutian Islands to the Gulf of Alaska and the pressure remained low over this area until the close of the month, during which time the pressure continued abnormally high over the region west of the Rocky Mountains, attended by generally fair weather with temperature near or somewhat below the normal in nearly all sections except southern California, where temperatures were unseasonably high.—*E. H. Bowie.*

RIVERS AND FLOODS

By H. C. FRANKENFIELD

There were no floods during the month of November except in the Willamette River of Oregon and a few of its tributary streams.

After a season that was the driest of record heavy rains set in about October 25 west of the Cascade Mountains, and during the nine-day period from October 25 to November 2, inclusive, the precipitation ranged from about 3.5 to more than 20 inches. The heaviest rains

fell on the southern coast, but over portions of the Willamette Valley the fall exceeded 14 inches. As the soil was extremely dry, the floods were not severe, and flood stages were not general except in the upper tributaries. There was a second rise later in the month from some moderately heavy rains falling upon the saturated soil, and the main stream rose to higher stages than were reached during the first rise.

Warnings were issued at the proper time and no serious preventable damage occurred. The total losses reported amounted to \$66,700, almost entirely to railroad property, highways and bridges.

Beginning with December 1, 1924, all published stages of water at locks and dams on the Ohio River will be referred to the zero of the *low-water* gage at each dam. Changes, where made, were for the purpose of securing uniformity and will prove of material assistance in the efficient operation of the numerous locks and dams.

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ATLANTIC DRAINAGE					
Santee: Rimini, S. C.-----	<i>Feet</i> 12	24	24	<i>Feet</i> 12.0	24
PACIFIC DRAINAGE					
Willamette:					
Eugene, Oreg.-----	10	{ 1	3	14.0	1
Oregon City, Oreg.-----	12	{ 22	22	12.3	22
Willamette (Coast Fork) Saginaw, Oreg.-----	12	{ 24	24	12.0	24
Santiam: Jefferson, Oreg.-----	9	(1) 2	3	12.4	Oct. 31
	10	{ 2	2	11.0	2
		{ 22	22	13.8	22

¹ Continued from last month.

MEAN LAKE LEVELS DURING NOVEMBER, 1924

By UNITED STATES LAKE SURVEY

[Detroit, Mich., December 3, 1924]

The following data are reported in the "Notice to Mariners" of the above date:

Data	Lakes ¹			
	Superior	Michigan and Huron	Erie	Ontario
Mean level during November, 1924:				
Above mean sea level at New York.-----	Feet 601.72	Feet 578.76	Feet 571.08	Feet 244.95
Above or below—				
Mean stage of October, 1924.-----	— .17	— .42	— .62	— .50
Mean stage of November, 1923.-----	— .17	— .30	+ .12	.61
Average stage for November, last 10 years.-----	— .76	— 1.36	— .72	— .47
Highest recorded November stage.-----	— 1.79	— 4.16	— 2.59	— 2.87
Lowest recorded November stage.-----	+ .22	— .30	+ .38	+ 1.54
Average relation of the November level to—				
October level.-----		— .2	— .2	— .2
December level.-----		+ .2	+ .1	+ .2

¹ Lake St. Clair's level: In November, 1924, 573.74 feet.

EFFECT OF WEATHER ON CROPS AND FARMING OPERATIONS, NOVEMBER, 1924

By J. B. KINCER

General conditions.—The first half of November was characterized by mild temperatures and very little rainfall in practically all sections east of the Rocky Mountains, and droughty conditions had become rather severe quite generally in that area. The principal effects of the deficient moisture in the interior and South were the dry-